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10/685,380	10/16/2003	Shinji Maekawa	740756-2660	9762

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EXAMINER	
GOODWIN, DAVID J	
ART UNIT	PAPER NUMBER
2818	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/685,380	MAEKAWA, SHINJI	
	Examiner	Art Unit	
	David Goodwin	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-69* is/are pending in the application.

4a) Of the above claim(s) *10-36* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 37-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194).

3. Grigoropoulis teaches a method of making a semiconductor device. Said method comprises providing a transparent substrate (102) and forming a semiconductor film (104) thereon (fig 1) (paragraph 0028). Said semiconductor film having undergone metal induced crystallization (paragraph 0080) which would introduce metal into the film and result in crystallinity. Said film (104) is subjected to irradiation by a second laser beam (108) in a direction from the direction of the semiconductor(104) layer to the substrate (102). A first laser beam (106) coming from the side of the transparent substrate (102) to the semiconductor layer (104) irradiates the film (104) (fig 1) (paragraph 0029).

4. Grigoropolous does not teach repeated irradiation of the semiconductor layer.

5. Wakita teaches a method of making a semiconductor layer. Said method comprises annealing a semiconductor layer using a laser (column 9 lines 5-50). Said annealing is repeated three or more times (column 10 lines 1-20).

6. It would have been obvious to one of ordinary skill in the art to repeat the annealing process taught by Grigoropoulis three or more times in order to reduce the number of defects and to flatten the surface of the layer.

7. Regarding claim 2.

8. Grigoropoulis teaches that the first and second laser beams are pulsed (paragraph 0006). The first laser source used is an argon laser (paragraph 0028) which generates a wavelength between that of visible light and vacuum ultraviolet.

1. Regarding claim 3.

2. Grigoropoulis teaches that the first laser source used is an argon laser (paragraph 0028) a gas laser.

3. Regarding claim 4.

4. Grigoropoulis teaches that the laser source of the second laser beam (108) is an excimer laser (paragraph 0028).

5. Regarding claim 5.

6. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

7. Regarding claim 7.

8. Grigoropoulis teaches that the first laser beam source (106) is an argon laser (paragraph 0028).

9. Regarding claim 8.

1. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

9. Claims 37-41, 43, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194).

10. Regarding claim 37

11. Grigoropoulis teaches a method of making a semiconductor device. Said method comprises providing a transparent substrate (102) and forming a semiconductor film (104) thereon (fig 1) (paragraph 0028). Said semiconductor film having undergone metal induced crystallization (paragraph 0080) which would introduce metal into the film and result in crystallinity. Said film (104) is subjected to irradiation by a second laser beam (108) in a direction from the direction of the semiconductor(104) layer to the substrate (102). A first laser beam (106) coming from the side of the transparent substrate (102) to the semiconductor layer (104) irradiates the film (104) (fig 1) (paragraph 0029).

12. Grigoropolous does not teach repeated irradiation of the semiconductor layer.

13. Wakita teaches a method of making a semiconductor layer. Said method comprises annealing a semiconductor layer using a laser (column 9 lines 5-50). Said annealing is repeated three or more times (column 10 lines 1-20). The semiconductor layer melts and recrystalizes between repetitions of laser annealing (column 9 lines 25-55).

2. It would have been obvious to one of ordinary skill in the art to repeat the annealing process taught by Grigoropoulis three or more times in order to reduce the number of defects and to flatten the surface of the layer.

3. Regarding claim 38.

14. Grigoropoulis teaches that the first and second laser beams are pulsed (paragraph 0006). The first laser source used is an argon laser (paragraph 0028) which generates a wavelength between that of visible light and vacuum ultraviolet.

10. Regarding claim 39.

11. Grigoropoulis teaches that the first laser source used is an argon laser (paragraph 0028) a gas laser.

12. Regarding claim 40.

13. Grigoropoulis teaches that the laser source of the second laser beam (108) is an excimer laser (paragraph 0028).

14. Regarding claim 41.

15. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

16. Regarding claim 43.

17. Grigoropoulis teaches that the first laser beam source (106) is an argon laser (paragraph 0028).

18. Regarding claim 44.

4. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

15. Claims 46-50, 52, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194).

16. Regarding claim 46

17. Grigoropoulis teaches a method of making a semiconductor device. Said method comprises providing a transparent substrate (102) and forming a semiconductor film (104) thereon (fig 1) (paragraph 0028). Said semiconductor film having undergone metal induced crystallization (paragraph 0080) which would introduce metal into the film and result in crystallinity. Said film (104) is subjected to irradiation by a second laser beam (108) in a direction from the direction of the semiconductor(104) layer to the substrate (102). A first laser beam (106) coming from the side of the transparent substrate (102) to the semiconductor layer (104) irradiates the film (104) (fig 1) (paragraph 0029).

18. Grigoropolous does not teach repeated irradiation of the semiconductor layer.

19. Wakita teaches a method of making a semiconductor layer. Said method comprises annealing a semiconductor layer using a laser (column 9 lines 5-50). Said annealing is repeated three or more times (column 10 lines 1-20). The semiconductor layer melts and recrystalizes between repetitions of laser annealing (column 9 lines 25-55).

5. It would have been obvious to one of ordinary skill in the art to repeat the annealing process taught by Grigoropoulis three or more times in order to reduce the number of defects and to flatten the surface of the layer.

6. Regarding claim 47.

20. Grigoropoulis teaches that the first and second laser beams are pulsed (paragraph 0006). The first laser source used is an argon laser (paragraph 0028) which generates a wavelength between that of visible light and vacuum ultraviolet.

19. Regarding claim 48.

20. Grigoropoulis teaches that the first laser source used is an argon laser (paragraph 0028) a gas laser.

21. Regarding claim 49.

22. Grigoropoulis teaches that the laser source of the second laser beam (108) is an excimer laser (paragraph 0028).

23. Regarding claim 50.

24. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

25. Regarding claim 52.

26. Grigoropoulis teaches that the first laser beam source (106) is an argon laser (paragraph 0028).

27. Regarding claim 53.

7. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

8. Claims 61-65, 67, and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194).

9. Regarding claim 61.

21. Grigoropoulis teaches a method of making a semiconductor device. Said method comprises providing a transparent substrate (102) and forming a semiconductor film (104) thereon (fig 1) (paragraph 0028). Said semiconductor film having undergone metal induced crystallization (paragraph 0080) which would introduce metal into the film and result in crystallinity. Said film (104) is subjected to irradiation by a second laser beam (108) in a direction from the direction of the semiconductor(104) layer to the substrate (102). A first laser beam (106) coming from the side of the transparent substrate (102) to the semiconductor layer (104) irradiates the film (104) (fig 1) (paragraph 0029). Irradiation will cause the metal to diffuse to the defects in the crystalline semiconductor film.

22. Grigoropolous does not teach repeated irradiation of the semiconductor layer.

23. Wakita teaches a method of making a semiconductor layer. Said method comprises annealing a semiconductor layer using a laser (column 9 lines 5-50). Said annealing is repeated three or more times (column 10 lines 1-20).

10. It would have been obvious to one of ordinary skill in the art to repeat the annealing process taught by Grigoropoulis three or more times in order to reduce the number of defects and to flatten the surface of the layer.

11. Regarding claim 62.

24. Grigoropoulis teaches that the first and second laser beams are pulsed (paragraph 0006). The first laser source used is an argon laser (paragraph 0028) which generates a wavelength between that of visible light and vacuum ultraviolet.

28. Regarding claim 63.

29. Grigoropoulis teaches that the first laser source used is an argon laser (paragraph 0028) a gas laser.

30. Regarding claim 64.

31. Grigoropoulis teaches that the laser source of the second laser beam (108) is an excimer laser (paragraph 0028).

32. Regarding claim 65.

33. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

34. Regarding claim 67.

35. Grigoropoulis teaches that the first laser beam source (106) is an argon laser (paragraph 0028).

36. Regarding claim 68.

12. Grigoropoulis teaches that the said excimer laser comprises a KrF laser (paragraph 0028).

13. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194). as applied to claim 1 above, and further in view of Chang (US 6,399,959).

14. Regarding claim 55.

15. Grigoropolus in view of Wakita teaches elements of the claimed invention above.

16. Grigoropolis further teaches that an amorphous crystal film is formed on a transparent susbstrate (paragraph 0027, 28).the use of metal induced crystallization of an amorphous layer prior to the laser treatment (paragraph 0080).

17. Grigoropolus in view of Wakita does not explain what metal induced crystallization is.

18. Chang teaches that metal induced crystallization comprises providing an amorphous semiconductorm adding a metal element to the amorphous layer, and heating to crystallize the amorphous layer.

19. It would have been obvious to one of ordinary skill in the art to use the steps of metal induced crystallization to crystallize the layer in order to crystallize the layer at a low temperature and in the manner called for

20.

21. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194). as applied to claim 37 above, and further in view of Chang (US 6,399,959).

22. Regarding claim 56.

23. Grigoropolus in view of Wakita teaches elements of the claimed invention above.

24. Grigoropolis further teaches that an amorphous crystal film is formed on a transparent susbstrate (paragraph 0027, 28).the use of metal induced crystallization of an amorphous layer prior to the laser treatment (paragraph 0080).

25. Grigoropolus in view of Wakita does not explain what metal induced crystallization is.

26. Chang teaches that metal induced crystallization comprises providing an amorphous semiconductorm adding a metal element to the amorphous layer, and heating to crystallize the amorphous layer.

27. It would have been obvious to one of ordinary skill in the art to use the steps of metal induced crystallization to crystallize the layer in order to crystallize the layer at a low temperature and in the manner called for.

28. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194). as applied to claim 46 above, and further in view of Chang (US 6,399,959).

29. Regarding claim 57.

30. Grigoropolus in view of Wakita teaches elements of the claimed invention above.

31. Grigoropolis further teaches that an amorphous crystal film is formed on a transparent susbstrate (paragraph 0027, 28).the use of metal induced crystallization of an amorphous layer prior to the laser treatment (paragraph 0080).

32. Grigoropolus in view of Wakita does not explain what metal induced crystallization is.

33. Chang teaches that metal induced crystallization comprises providing an amorphous semiconductorm adding a metal element to the amorphous layer, and heating to crystallize the amorphous layer.

34. It would have been obvious to one of ordinary skill in the art to use the steps of metal induced crystallization to crystallize the layer in order to crystallize the layer at a low temperature and in the manner called for.

35. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194). as applied to claim 1 above, and further in view of Chang (US 6,399,959).

36. Regarding claim 58.

37. Grigoropolus in view of Wakita teaches elements of the claimed invention above.

38. Grigoropolus in view of Wakita does not teach the gettering of the metal element after the laser treatment.

39. Chang teaches the formation of a gettering (210) layer underlying the recrystalized active layer (220) (column 3 lines 10-30) which will getter metal from the active layer during and after processing.

40. It would have been obvious to one of ordinary skill in the art to form a gettering layer in order to reduce the metal impurity pollution in the active layer.

41. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194). as applied to claim 37 above, and further in view of Chang (US 6,399,959).

42. Regarding claim 59.

43. Grigoropolus in view of Wakita teaches elements of the claimed invention above.

44. Grigoropolus in view of Wakita does not teach the gettering of the metal element after the laser treatment.

45. Chang teaches the formation of a gettering (210) layer underlying the recrystalized active layer (220) (column 3 lines 10-30) which will getter metal from the active layer during and after processing.

46. It would have been obvious to one of ordinary skill in the art to form a gettering layer in order to reduce the metal impurity pollution in the active layer.

47. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulous (US 2003/0003636) in view of Wakita (US 6,072,194). as applied to claim 46 above, and further in view of Chang (US 6,399,959).

48. Regarding claim 60.

49. Grigoropolus in view of Wakita teaches elements of the claimed invention above.

50. Grigoropolus in view of Wakita does not teach the gettering of the metal element after the laser treatment.

51. Chang teaches the formation of a gettering (210) layer underlying the recrystalized active layer (220) (column 3 lines 10-30) which will getter metal from the active layer during and after processing.

52. It would have been obvious to one of ordinary skill in the art to form a gettering layer in order to reduce the metal impurity pollution in the active layer.

53. Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulis (US 2003/0003636) in view of Wakita (US 6,072,194) as applied to claim 1 and further in view of Ogawa (US 6,884,699).

37. Regarding claims 6 and 9.

38. Grigoropoulis in view of Wakita teaches elements of the claimed invention above in the rejection of claim 1.

39. Grigoropoulis in view of Wakita does not teach that the laser sources may comprise a YAG laser.

40. Ogawa teaches a method of recrystallizing a semiconductor layer. Said method comprises a laser wherein the laser comprises the second harmonic of a YAG source (column 13 lines 10-25).

1. It would have been obvious to one of ordinary skill in the art to use a second harmonic of a YAG laser in the recrystallization of a semiconductor film because it would permit greater latitude and control over the process to employ different laser sources.

2. Claims 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulis (US 2003/0003636) in view of Wakita (US 6,072,194) as applied to claim 37 and further in view of Ogawa (US 6,884,699).

41. Regarding claims 42 and 49

42. Grigoropoulis in view of Wakita teaches elements of the claimed invention above in the rejection of claim 1.

43. Grigoropoulis in view of Wakita does not teach that the laser sources may comprise a YAG laser.

44. Ogawa teaches a method of recrystallizing a semiconductor layer. Said method comprises a laser wherein the laser comprises the second harmonic of a YAG source (column 13 lines 10-25).

3. It would have been obvious to one of ordinary skill in the art to use a second harmonic of a YAG laser in the recrystallization of a semiconductor film because it would permit greater latitude and control over the process to employ different laser sources.

4. Claims 51 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulis (US 2003/0003636) in view of Wakita (US 6,072,194) as applied to claim 37 and further in view of Ogawa (US 6,884,699).

45. Regarding claims 51 and 54

46. Grigoropoulis in view of Wakita teaches elements of the claimed invention above in the rejection of claim 1.

47. Grigoropoulis in view of Wakita does not teach that the laser sources may comprise a YAG laser.

48. Ogawa teaches a method of recrystallizing a semiconductor layer. Said method comprises a laser wherein the laser comprises the second harmonic of a YAG source (column 13 lines 10-25).

5. It would have been obvious to one of ordinary skill in the art to use a second harmonic of a YAG laser in the recrystallization of a semiconductor film because it would permit greater latitude and control over the process to employ different laser sources.

6. Claims 66 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grigoropoulis (US 2003/0003636) in view of Wakita (US 6,072,194) as applied to claim 37 and further in view of Ogawa (US 6,884,699).

49. Regarding claims 66 and 69

50. Grigoropoulis in view of Wakita teaches elements of the claimed invention above in the rejection of claim 61.

51. Grigoropoulis in view of Wakita does not teach that the laser sources may comprise a YAG laser.

52. Ogawa teaches a method of recrystallizing a semiconductor layer. Said method comprises a laser wherein the laser comprises the second harmonic of a YAG source (column 13 lines 10-25).

7. It would have been obvious to one of ordinary skill in the art to use a second harmonic of a YAG laser in the recrystallization of a semiconductor film because it would permit greater latitude and control over the process to employ different laser sources.

Response to Arguments

8. Applicant's arguments filed 1/31/07 have been fully considered but they are not persuasive.

9. The applicant argues that the art is not compatible as Grigoropolis requires a superposition of laser beam whereas Wkaita requires a separation of timing.

10. The applicant will note the reference was applied to teach the repetition of the laser annealing process not that the laser beams were no longer superimposed.

11. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re*

Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, The motivation for the combination comes from the Wakita teaching that the repetition of the exposures will steadily reduce the number of crystal defects.

12. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

13. Further, each individual type of laser is merely a functional equivalent for delivering photons to the surface of the substrate. MPEP 2144.06. Therefore individually claiming each variety does not patentably distinguish the device.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Goodwin whose telephone number is (571)272-8451. The examiner can normally be reached on Monday through Friday, 9:00am through 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571)272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DJG

Andy Hnyph
Primary Examiner